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**ROTEL**®

# Technical Manual

## STEREO DC INTEGRATED AMPLIFIER

# RA-1010

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**Serial Nos. Beginning  
NC59118**

### ADDENDA (November, 1981)

1. FETs Q401 and Q402 on the MC head-amp circuit can accept both (S) and (R)  $I_{DSS}$  ranks.
  - a. Therefore it is necessary to use appropriate drain resistors R403 and R404 according to the  $I_{DSS}$  rank of the FETs.  
2SK155: For  $I_{DSS}$  (S) rank; R403, R404 — 820 ohms (conventional value)  
For  $I_{DSS}$  (R) rank: R403, R404 — 2.7 kilohms
  - b. A 2.2-kilohm resistor is additionally installed between the junction of R438 and R439 on +B circuit of the MC head-amp when (R) rank FET is used.
  - c. 2SK155 (R) and 2SK155 (S) are replaceable by 2SK130A (K) and 2SK130A (L) respectively.  
Part No. 2SK130A (K) — 302001135  
2SK130A (L) — 302001136
2. For 220V/240V spec. units, noise cancellers C002 and C003 installed between the primary side of the power supply circuit are eliminated.  
C001 is changed from 0.047 to 0.022 (PME265MB-522, Part No. 470101136).
3. For 220V/240V spec. units, secondary fuse F901 is changed from F1A to T1A (Part No. 345952100).

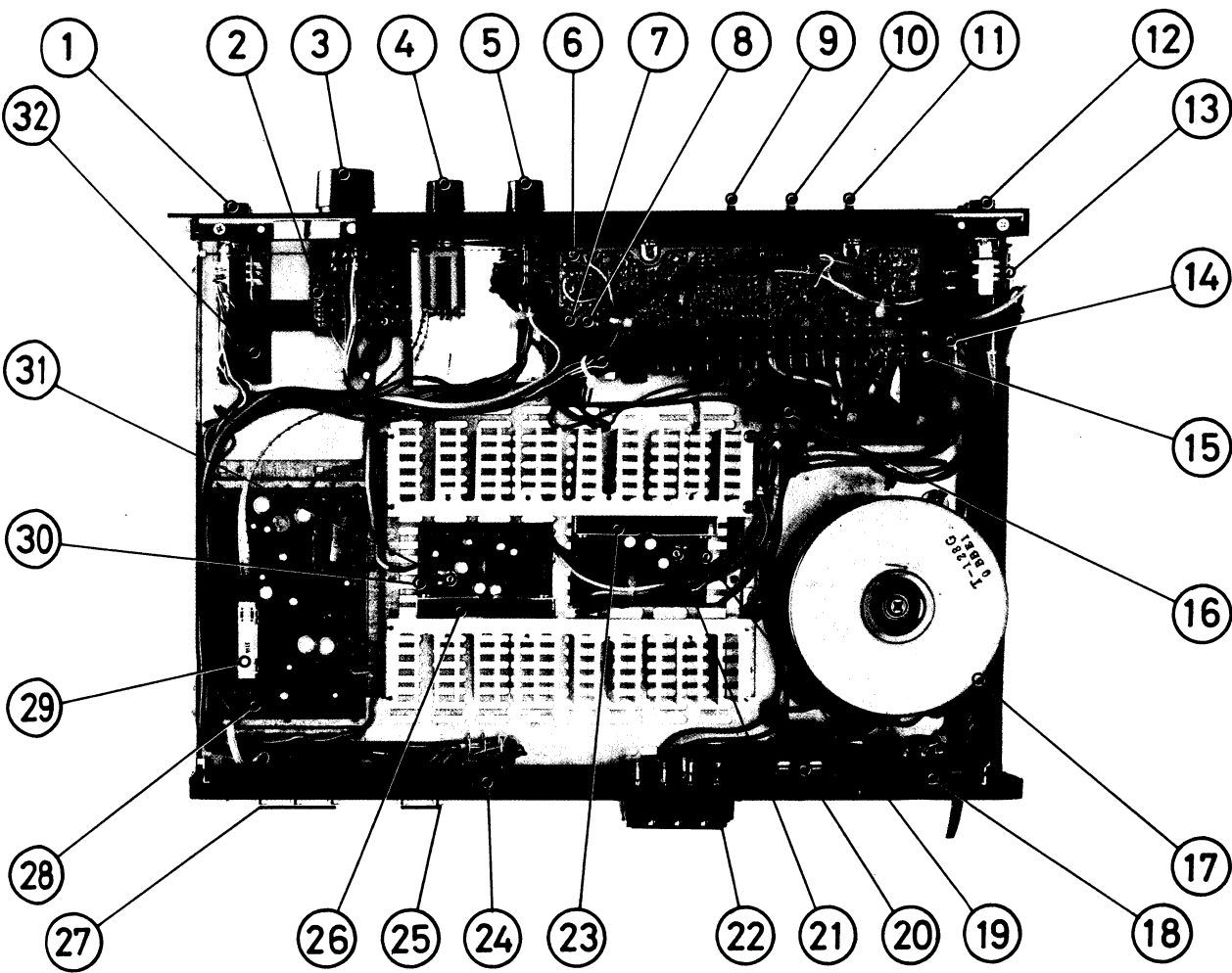
### ADDENDA (Novembre, 1981)

1. Les FET Q401 et Q402 du circuit d'ampli frontal MC peuvent accepter les niveaux  $I_{DSS}$  (S) et (R).
  - a. En conséquence il est nécessaire d'utiliser des résistances de drainage R403 et R404 adéquates en fonction du niveau  $I_{DSS}$  des FET.  
2SK155: Pour niveau (S)  $I_{DSS}$ ; R403, R404 — 820 ohms (valeur conventionnelle)  
Pour niveau (R)  $I_{DSS}$ ; R403, R404 — 2,7 kilohms.
  - b. Une résistance additionnelle de 2,2 kilohms est ajoutée entre la jonction de R438 et R439 sur le circuit +B de l'ampli frontal MC lorsque le FET utilisé est de niveau (R).
  - c. 2SK155 (R) et 2SK155 (S) sont remplaçables respectivement par 2SK130A (K) et 2SK130A (L).  
No. de pièce 2SK130A (K) — 302001135  
No. de pièce 2SK130A (L) — 302001136
2. Pour les unités alimentées sur 220V/240V, les supprimeurs de bruit C002 et C003 insérés entre le côté primaire du circuit d'alimentation sont éliminés.  
C001 passe de 0,047 à 0,022 (PME265MB522, No. de pièce 470101136).
3. Pour les unités alimentées sur 220V/240V, le fusible secondaire F901 passe de F1A à T1A (No. de pièce 345952100).

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NANKING E. ROAD, TAIPEI, TAIWAN, REPUBLIC OF CHINA  
1055 SAW MILL RIVER ROAD, ARDSLEY, N.Y. 10502, U.S.A.  
2-4 ERICA ROAD, STACEY BUSHES, MILTON KEYNES,  
BUCKINGHAMSHIRE, ENGLAND

Chassis Layout (Top View)  
Installation du châssis (vue de dessus)



1. FUNCTION SELECTOR

2. TONE AMP PCB

3. VOLUME CONTROL

4. PHONO SELECTOR UNIT

5. TAPE MONITOR SWITCH

6. INDICATOR DRIVER PCB

7. VR812, R-CH LEVEL IND CAL

8. VR811, L-CH LEVEL IND CAL

9. TREBLE CONTROL

10. MID CONTROL

11. BASS CONTROL

12. POWER SWITCH

13. SPEAKER SWITCH PCB

14. POWER SUPPLY PCB

15. FUSE, F901, SECONDARY

16. PROTECTION RELAY
17. POWER TRANSFORMER

18. VOLTAGE SELECTOR

19. MAIN AMP PCB, L-CH

20. FUSE, F001, PRIMARY

21. VR601, DC BALANCE ADJ, L-CH

22. SPEAKER TERMINALS

23. POWER AMP IC, IC601, L-CH

24. DIN SOCKET

25. TAPE MONITOR JACKS

26. POWER AMP IC, IC601', R-CH

27. INPUT JACKS

28. PHONO AMP PCB

29. PHONO SWITCH

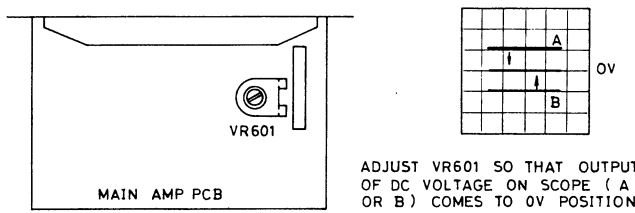
30. MAIN AMP PCB, R-CH

31. VR601', DC BALANCE ADJ, R-CH

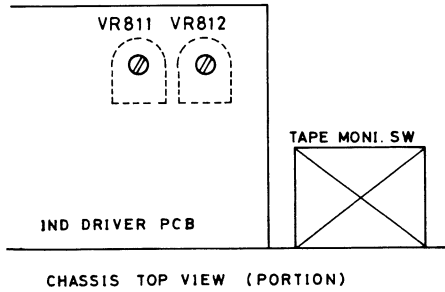
32. MUTING SWITCH PCB

Adjustment Procedures  
DC BALANCE ADJUSTMENT

- Instrument:** Oscilloscope
- It will take 3 to 7 seconds for the unit to go into operation after power is turned on.
- Set vertical gain control of the oscilloscope to 0.01 V/cm, and vertical input switch to GND. Bring the trace to central position on the screen; then set the vertical input switch to DC.
  - Connect the oscilloscope to speaker terminals of amplifier. Set volume control of the amplifier to minimum position. Turn on the power. When DC output appears on the screen (the trace will shift upwards or downwards as shown in Fig.1), adjust potentiometer VR601 on the main-amplifier PC board so that the DC output trace falls on zero position (the position set up in step 1).
  - Repeat the adjustment in step 2 for the other channel.



- POWER LEVEL INDICATOR CALIBRATION**
- Instruments:** Audio Generator, AC Voltmeter, Oscilloscope, Load Resistor (8-ohm, 100 watts, non-inductive)
- Connect the load resistor to the speaker terminal. Connect AC voltmeter and oscilloscope in parallel with the resistor. Connect the Audio Generator to AUX terminal. Turn the volume control of the unit to maximum. Then feed 1,000Hz (sine wave) signal from Audio Generator and adjust the input level so that AC voltmeter reads 21.9V (60 watts, 8 ohms). Maintaining this state, adjust the potentiometer VR811 or VR 812 on the Indicator Driver PC board so that the level indicator reads 0dB (0dB LED turns on). See Fig. 2.
  - Follow the same procedures to adjust the other channel by turning VR812 or VR811.



Réglage  
Réglage de l'équilibrage courant continu

- Instrument:** Oscilloscope
- Il prendra 3 à 7 secondes pour l'unité afin de mettre en opération depuis que l'alimentation soit allumée.
- Poser la commande de gain vertical de l'oscilloscope à 0,01 V/cm, et l'interrupteur d'entrée verticale à GND. Apporter la trace à la position centrale sur l'écran; puis poser l'interrupteur d'entrée verticale à DC.
  - Connecter l'oscilloscope aux bornes de haut-parleur de l'amplificateur. Poser la commande de volume de l'amplificateur à la position minimale. Allumer l'alimentation. Lorsque la sortie de CC apparaît sur l'écran (la trace déplacera en haut ou en bas comme montré sur la Fig. 1), ajuster le potentiomètre VR601 sur la plaquette d'amplification principale de sorte que la trace de sortie de CC tombe sur la position zéro (la position établie dans le pas 1).
  - Répéter l'ajustage dans le pas 2 pour l'autre canal.

Fig. 1

Réglage du indicateur de niveau de puissance

- Instruments:** un générateur d'audio fréquences, un voltmètre à courant alternatif, un oscilloscope, une résistance de charge (de 8 ohms, 100 watts, non-inductive).
- Connectez la résistance de charge aux bornes des haut-parleurs. Connectez le voltmètre à courant alternatif et l'oscilloscope en parallèle avec la résistance. Connectez le générateur aux bornes auxiliaires (AUX) de l'unité. Tournez le potentiomètre de volume de l'unité au maximum. Puis envoyez un signal de 1.000Hz (onde sinusoïdale) avec le générateur et ajustez le niveau d'entrée de façon que le voltmètre indique une mesure de 21,9V (60 watts, 8 ohms), tout en conservant cet arrangement, réglez le potentiomètre VR811 ou VR812 de la plaquette de l'étage du bord d'attaque de façon que le voltmètre de crête indique une mesure de 0dB (à 0dB les diodes lumineuses "LED" sont éteintes. Voir figure 2).
  - Suivez le même procédé pour ajuster l'autre canal en tournant le VR812 ou VR811.

Fig. 2

Repair Parts List  
Liste des pièces

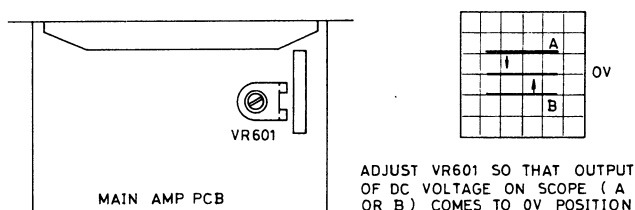
| Schematic Location  | Des      |
|---------------------|----------|
| TRANSISTOR          |          |
| Q401, 402           | 2SK155   |
| Q403, 404, 904      | 2SA921   |
| Q405, 902           | 2SC131   |
| Q501, 502           | 2SC132   |
| Q601                | μPA63I   |
| Q811, 812, 815      | 2SC828   |
| 816, 906            |          |
| Q813, 814           | 2SC138   |
| Q817, 818, 821      | 2SA564   |
| 822 to 833          |          |
| Q819, 820           | 2SK68/   |
| Q901, 903           | 2SC198   |
| D401, 402           | RD3-6E   |
| D403                | BZ-120   |
| D601, 906           | WZ-162   |
| D602, 811 to 814    | WZ-067   |
| D815 to 818         | 1K188,   |
| D819 to 829         | MA-15C   |
| 903 to 905          |          |
| D830                | RB-152   |
| D901                | S5VB-2   |
| D902                | SR1K-4   |
| D907, 908           | BZ-240   |
| D909, 910           | BZ-140   |
|                     | SEL88C   |
| IC401, 402          | HA-14E   |
| IC501, 703          | NJM45    |
| IC601               | SI-146C  |
| IC701, 702, 811     | NJM45    |
| IC812, 813          | TA761    |
| VARIAE              |          |
| VR501               | 250KW    |
| VR601               | 300B, I  |
| VR701, 702, 703     | 50KWT    |
| VR811, 812          | 50KB,    |
| VR001               | 100KB    |
| S                   |          |
| S1                  | Push 3-  |
|                     | Selecto  |
| S2                  | Slide, F |
| S3                  | Rotary   |
| S4                  | Push 1-  |
| S5, 6, 7, 8 (1 set) | Push 4-  |
| S9, 10 (1 set)      | Push 2-  |
| S11, 12, 13 (1 set) | Push 3-  |
| L601                | Coil, A  |
| RY901               | Relay,   |
| T001                | Power    |
|                     | (120, 2  |
|                     | (100, 1  |
| PL001               | Lamp,    |
| F901                | Fuse, 1  |
|                     | (STD)    |
|                     | Fuse, 1  |
|                     | (CEE)    |
| F001                | Fuse, 5  |
|                     | (STD)    |
|                     | Fuse, 2  |
|                     | Type (   |

## Adjustment Procedures

### DC BALANCE ADJUSTMENT

**Instrument:** Oscilloscope

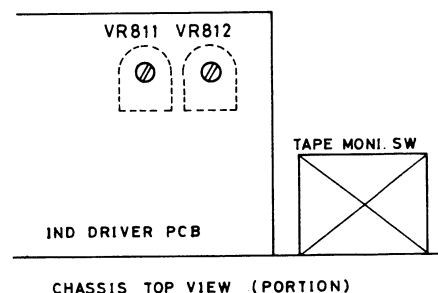
- It will take 3 to 7 seconds for the unit to go into operation after power is turned on.
- Set vertical gain control of the oscilloscope to 0.01V/cm, and vertical input switch to GND. Bring the trace to central position on the screen; then set the vertical input switch to DC.
  - Connect the oscilloscope to speaker terminals of amplifier. Set volume control of the amplifier to minimum position. Turn on the power. When DC output appears on the screen (the trace will shift upwards or downwards as shown in Fig. 1), adjust potentiometer VR601 on the main-amplifier PC board so that the DC output trace falls on zero position (the position set up in step 1).
  - Repeat the adjustment in step 2 for the other channel.



### POWER LEVEL INDICATOR CALIBRATION

**Instruments:** Audio Generator, AC Voltmeter, Oscilloscope, Load Resistor (8-ohm, 100 watts, non-inductive)

- Connect the load resistor to the speaker terminal. Connect AC voltmeter and oscilloscope in parallel with the resistor.
- Connect the Audio Generator to AUX terminal. Turn the volume control of the unit to maximum. Then feed 1,000Hz (sine wave) signal from Audio Generator and adjust the input level so that AC voltmeter reads 21.9V (60 watts, 8 ohms).
- Maintaining this state, adjust the potentiometer VR811 or VR 812 on the Indicator Driver PC board so that the level indicator reads 0dB (0dB LED turns on). See Fig. 2.
- Follow the same procedures to adjust the other channel by turning VR812 or VR811.



## Réglage

### Réglage de l'équilibrage courant continu

**Instrument:** Oscilloscope

- Il prendra 3 à 7 secondes pour l'unité afin de mettre en opération depuis que l'alimentation soit allumée.
- Poser la commande de gain vertical de l'oscilloscope à 0,01 V/cm, et l'interrupteur d'entrée verticale à GND. Apporter la trace à la position centrale sur l'écran; puis poser l'interrupteur d'entrée verticale à DC.
  - Connecter l'oscilloscope aux bornes de haut-parleur de l'amplificateur. Poser la commande de volume de l'amplificateur à la position minimale. Allumer l'alimentation. Lorsque la sortie de CC apparaît sur l'écran (la trace déplacera en haut ou en bas comme montré sur la Fig. 1), ajuster le potentiomètre VR601 sur la plaquette d'amplification principale de sorte que la trace de sortie de CC tombe sur la position zéro (la position établie dans le pas 1).
  - Répéter l'ajustage dans le pas 2 pour l'autre canal.

Fig. 1

### Réglage du indicateur de niveau de puissance

**Instruments:** un générateur d'audio fréquences, un voltmètre à courant alternatif, un oscilloscope, une résistance de charge (de 8 ohms, 100 watts, non-inductive).

- Connectez la résistance de charge aux bornes des haut-parleurs.
- Connectez le voltmètre à courant alternatif et l'oscilloscope en parallèle avec la résistance.
- Connectez le générateur aux bornes auxiliaires (AUX) de l'unité.
- Tournez le potentiomètre de volume de l'unité au maximum. Puis envoyez un signal de 1.000Hz (onde sinusoïdale) avec le générateur et ajustez le niveau d'entrée de façon que le voltmètre indique une mesure de 21,9V (60 watts, 8 ohms), tout en conservant cet arrangement, réglez le potentiomètre VR811 ou VR812 de la plaquette de l'étage du bord d'attaque de façon que le voltmètre de crête indique une mesure de 0dB (à 0dB les diodes lumineuses "LED" sont éteintes. Voir figure 2.
- Suivez le même procédé pour ajuster l'autre canal en tournant le VR812 ou VR811.

Fig. 2

## Repair Parts List

### Liste des pièces de rechange

| Schematic Location                  | Description                                | Part No.  |
|-------------------------------------|--|-----------|
| <b>TRANSISTORS, DIODES AND IC'S</b> |  |           |
| Q401, 402                           | 2SK155 (S)                                 | 302001123 |
| Q403, 404, 904                      | 2SA921 (S or T)                            | 301001145 |
| Q405, 902                           | 2SC1318 (S)                                | 301201155 |
| Q501, 502                           | 2SC1327 (R or S)                           | 301201134 |
| Q601                                | μPA63H (M1 or M2), Dual FET                | 302001121 |
| Q811, 812, 815                      | 2SC828 (S or T)                            | 301201115 |
| 816, 906                            |  |           |
| Q813, 814                           | 2SC1384 (R or S)                           | 301201162 |
| Q817, 818, 821                      | 2SA564 (Q, R or S)                         | 301001146 |
| 822 to 833                          |  |           |
| Q819, 820                           | 2SK68A (L or M)                            | 302001113 |
| Q901, 903                           | 2SC1980 (S or T)                           | 301201171 |
| D401, 402                           | RD3-6EC, Zener, 3.6V, 400mW                | 300313039 |
| D403                                | BZ-120, Zener, 12V, 1W                     | 300313004 |
| D601, 906                           | WZ-162, Zener, 16V, 500mW                  | 300313017 |
| D602, 811 to 814                    | WZ-067, Zener, 6.7V, 500mW                 | 300313036 |
| D815 to 818                         | 1K188, Diode (Ge)                          | 300111008 |
| D819 to 829                         | MA-150, Diode (Si)                         | 300111016 |
| 903 to 905                          |  |           |
| D830                                | RB-152, Rectifier                          | 300919038 |
| D901                                | S5VB-20, Rectifier                         | 300919032 |
| D902                                | SR1K-4, Rectifier                          | 300919024 |
| D907, 908                           | BZ-240, Zener, 24V, 1W                     | 300313009 |
| D909, 910                           | BZ-140, Zener, 14V, 1W                     | 300313005 |
|                                     | SEL8801R02, LED ARRAY                      | 300414039 |
| IC401, 402                          | HA-1457W-02, Phono Amp                     | 303452192 |
| IC501, 703                          | NJM4558D-D, Tone Amp, etc.                 | 303452152 |
| IC601                               | SI-1460H, Power Amp                        | 303452220 |
| IC701, 702, 811                     | NJM4558D, Tone, etc.                       | 303452215 |
| IC812, 813                          | TA7612AP                                   | 303452208 |
| <b>VARIABLE RESISTORS</b>           |  |           |
| VR501                               | 250KWT, Balance Control                    | 515121130 |
| VR601                               | 300B, DC Balance Adj                       | 510502187 |
| VR701, 702, 703                     | 50KWT x 2, Tone Control                    | 525121148 |
| VR811, 812                          | 50KB, Level Ind Cal                        | 510502191 |
| VR001                               | 100KB x 2, Volume Control                  | 525321118 |
| <b>SWITCHES</b>                     |  |           |
| S1                                  | Push 3-key gang, Function Selector         | 614030827 |
| S2                                  | Slide, Remote, Phono Selector              | 615212273 |
| S3                                  | Rotary, Tape Monitor                       | 601011271 |
| S4                                  | Push 1-key, Muting                         | 614010144 |
| S5, 6, 7, 8 (1 set)                 | Push 4-key, Loudness, etc.                 | 614040828 |
| S9, 10 (1 set)                      | Push 2-key, Tone Defeat, etc.              | 614020437 |
| S11, 12, 13 (1 set)                 | Push 3-key, Speaker, Power                 | 614030829 |
| <b>OTHERS</b>                       |  |           |
| L601                                | Coil, Anti-parasitic                       | 228641126 |
| RY901                               | Relay, Protection                          | 240111247 |
| T001                                | Power Transformer (120, 220, 240V, Type G) | 207001492 |
|                                     | (100, 120V, Type D)                        | 204001492 |
| PL001                               | Lamp, 8V, 150mA                            | 359101127 |
| F901                                | Fuse, 1A, 250V, Long Type (STD)            | 341222100 |
|                                     | Fuse, 1A, 250V, Midget Type (CEE)          | 345252100 |
| F001                                | Fuse, 5A, 250V, Long Type (STD)            | 341222500 |
|                                     | Fuse, 2.5AT, 250V, Midget Type (CEE)       | 345952250 |

| Schematic Location | Description                                     | Part No.  |
|--------------------|---|-----------|
| <b>C001</b>        |   |           |
|                    | Noise Canceller, NSK-135 (120V Area)            | 470101118 |
|                    | NSK-132 (Canada Only)                           | 470101129 |
|                    | PME271M, 0.047μF 'X' (220/240V Area)            | 470101122 |
|                    | ECQ-EC 0.047μF (220/240V Area)                  | 470101126 |
| <b>C002, 003</b>   |   |           |
|                    | Noise Canceller, MMS-472(M) (120V Area)         | 470101133 |
|                    | PME271Y447 (220/240V Area)                      | 470101124 |
|                    | Phono Amp PCB Ass'y                             | 141510175 |
|                    | Tone Amp & Muting PCB Ass'y                     | 141710329 |
|                    | Tone Control PCB Ass'y                          | 141710331 |
|                    | Main Amp PCB Ass'y (w/o Power IC and Heatsink)  | 141610331 |
|                    | Power Supply PCB Ass'y (w/Long Fuse)            | 141810995 |
|                    | Power Supply PCB Ass'y (w/Midget Fuse)          | 141811045 |
|                    | DIN Socket PCB Ass'y                            | 141810996 |
|                    | Speaker Switch PCB Ass'y (w/Power SW)           | 141810951 |
|                    | Function Selector PCB Ass'y                     | 141810958 |
|                    | Indicator Driver PCB Ass'y                      | 141810997 |
|                    | Switch Control Unit w/Flex Wire                 | 654101152 |
|                    | Fuse Holder (Long Fuse)                         | 648211184 |
|                    | Fuse Holder (Midget Fuse)                       | 648211245 |
|                    | Voltage Selector                                | 648211247 |
|                    | AC Outlet (STD) (Canada Only)                   | 648211255 |
|                    | Pin Jack, 2P, AUX                               | 624200202 |
|                    | Pin Jack, 4P, PHONO, TAPE MONITOR               | 624200204 |
|                    | Speaker Terminal, 4P                            | 642400111 |
|                    | Ground Terminal                                 | 770911119 |
|                    | Fuse Clip, Long Fuse                            | 648211146 |
|                    | Fuse Clip, Midget Fuse                          | 648211147 |
|                    | DIN Socket                                      | 625001119 |
|                    | Headphone Jack                                  | 626110033 |
|                    | Front Panel (Metallic Brown) (Black)            | 111911498 |
|                    | Knob, Volume (Metallic Brown) (Black)           | 116310289 |
|                    | Knob, Selector (Metallic Brown) (Black)         | 116310302 |
|                    | Knob, Balance, etc. (Metallic Brown) (Black)    | 116310285 |
|                    | Knob, Balance, etc. (Metallic Brown) (Black)    | 116310301 |
|                    | Button, Function, etc. (Metallic Brown) (Black) | 116310287 |
|                    | Button, Loudness, etc. (Metallic Brown) (Black) | 116310288 |
|                    | Scale Board                                     | 116210058 |
|                    | Bonnet  | 116210059 |
|                    | Foot (H=9.5mm)                                  | 116210056 |
|                    | Wire Clamper                                    | 116210057 |
|                    | Binder, Capacitor Mtg                           | 112011375 |
|                    | Screw, M2x4mm (Ni), Binding Head, LED Array Mtg | 138011304 |
|                    | M3x4mm (Ni), Binding Head                       | 673402025 |
|                    | M3x6mm (Ni), Binding Head                       | 672200859 |
|                    | M3x8mm (Ni), Binding Head                       | 672200878 |
|                    | M3x8mm (BLZ), Binding Head                      | 705212004 |
|                    | M3x10mm (Ni), Binding Head                      | 705213004 |
|                    | M3x15mm (Ni), Binding Head                      | 705213006 |
|                    | M3x6mm (Ni), Countersunk, Panel Mtg             | 705213008 |
|                    | M3x6mm (Ni), Oval-countersunk                   | 705223008 |
|                    | M4x8mm (BLZ), w/Flat Washer, Binding Head       | 705213010 |
|                    | M3x6mm (BLZ), Flat Head                         | 705213015 |
|                    |   | 701213006 |
|                    |   | 702213006 |
|                    |   | 715224008 |
|                    |   | 770911166 |

|   |           |
|---|-----------|
| Screw, Tapping-II, 3x6mm (Ni), Oval-countersunk | 722213006 |
| 3x8mm (ZBC), Bottom Cover Mtg                   | 726203008 |
| 3x8mm (Ni)                                      | 726213008 |
| 3x10mm (BLZ)                                    | 726223010 |
| 3x10mm (Ni)                                     | 726213010 |
| 3x12mm (Ni)                                     | 726213012 |
| 4x10mm (BLZ), Binding Head                      | 725224010 |
| Screw, Tap-tight, 4x10mm (Ni), Binding Head     | 765214010 |
| Washer, Flat, M7                                | 770500007 |
| M9  | 770500008 |
| Washer, Spring, M4                              | 770500004 |
| Washer, Teethed, M3                             | 770500014 |
| Nut, M3   | 770402201 |
| M4  | 770402202 |
| M7  | 770402205 |
| M9  | 770402207 |
| M12   | 770402209 |

## Specifications Caractéristiques

### AMPLIFIER SECTION

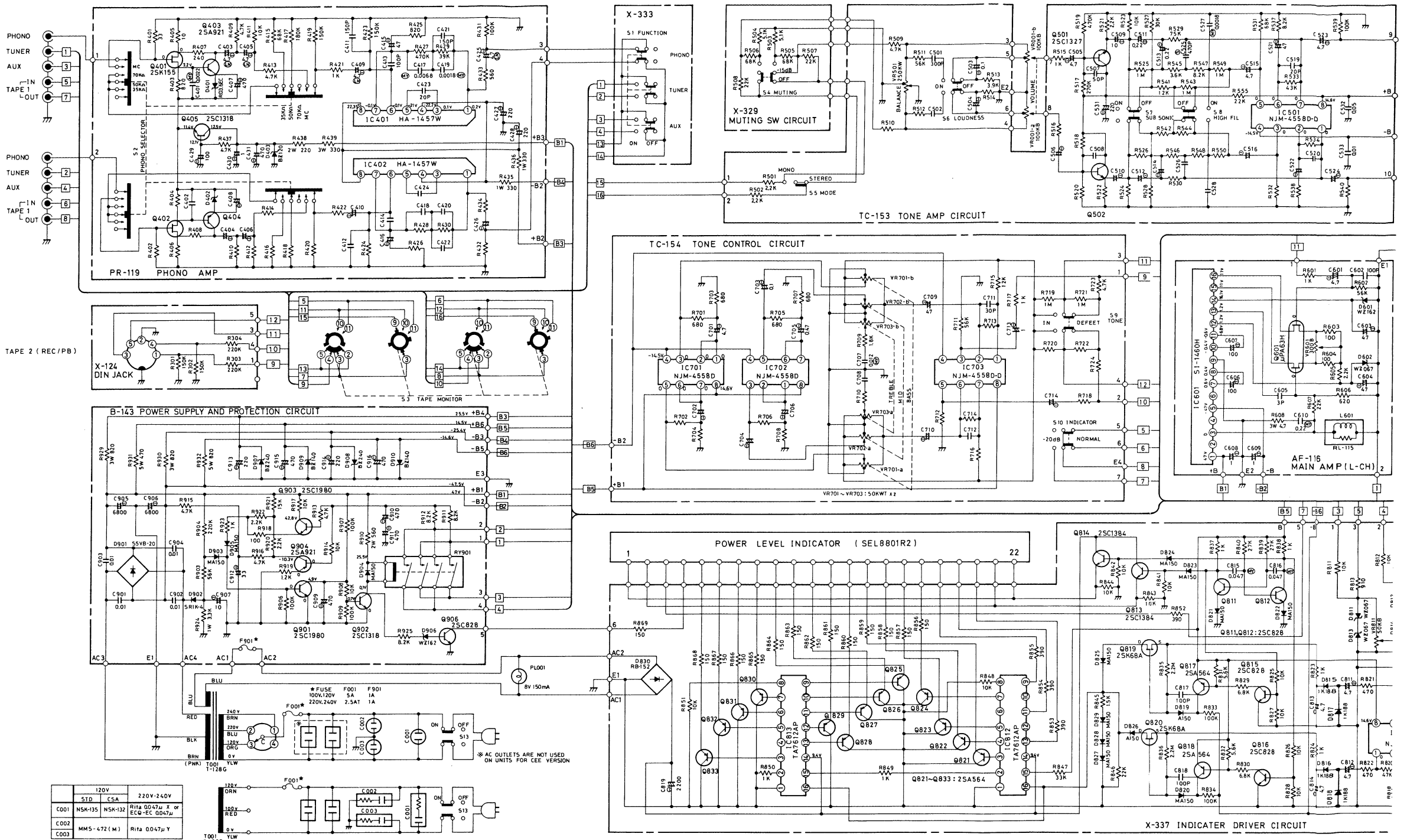
|                                    |   |
|------------------------------------|---|
| Continuous Power Output . .        | .60 watts* per channel, min. RMS, both channels driven at 8 ohms from 20 to 20,000Hz with no more than 0.03% total harmonic distortion                                      |
| Total Harmonic Distortion . .      | No more than 0.03% (continuous (20 to 20,000Hz from AUX)<br>No more than 0.009% (continuous 1/2 rated power output)<br>No more than 0.01% (1 watt per channel power output) |
| Intermodulation Distortion . .     | No more than 0.02% (continuous 60Hz : 7kHz = 4 : 1)<br>No more than 0.03% (continuous 1/2 rated power output)<br>No more than 0.03% (1 watt per channel power output)       |
| Damping Factor . . . . .           | .50 (20 to 20,000Hz, 8 ohms)  |
| Input Sensitivity Impedance        |   |
| PHONO (MM) . . . . .               | .25mV/70, 50, 35 kilohms  |
| PHONO (MC) . . . . .               | .012mV/30 ohms  |
| TUNER, AUX. . . . .                | .150mV/30 kilohms   |
| TAPE MONITOR 1, 2 . . . . .        | .150mV/30 kilohms   |
| Overload Level (T.H.D. 0.5%, 1kHz) |   |
| PHONO (MM) . . . . .               | .240mV  |
| PHONO (MC) . . . . .               | .11mV   |
| TUNER, AUX. . . . .                | .6V   |
| Frequency Response                 |   |
| AUX, TAPE IN . . . . .             | .5-70,000Hz, +0dB, -1.0dB (at 1 watt per channel power output)  |
| PHONO (MM) . . . . .               | .20-20,000Hz, $\pm 0.5$ dB (RIAA STD)   |

|   |                             |
|---|-----------------------------|
| Tone Control                                    |                             |
| BASS . . . . .                                  | $\pm 12$ dB (50Hz)          |
| MID . . . . .                                   | $\pm 12$ dB (1kHz)          |
| TREBLE . . . . .                                | $\pm 12$ dB (15kHz)         |
| HIGH Filter . . . . .                           | .12dB/oct (20kHz)           |
| SUBSONIC Filter . . . . .                       | .12dB/oct (15kHz)           |
| LOUDNESS (volume control set at -40dB position) |                             |
| . . . . .                                       | +10dB (100Hz), +4dB (10kHz) |
| Signal-to-Noise Ratio (IHF, A Network)          |                             |
| PHONO (MM) . . . . .                            | .76dB                       |
| PHONO (MC) . . . . .                            | .68dB                       |
| TUNER, AUX. . . . .                             | .92dB                       |
| TAPE MONITOR 1, 2 . . . . .                     | .92dB                       |
| Residual Noise . . . . .                        | .14mV                       |
| Audio Muting . . . . .                          | -15dB                       |

### MISCELLANEOUS

|                             |  |
|-----------------------------|--|
| Power Requirement . . . . . | .120V/60Hz, 220V/50Hz, 240V/50Hz or 120, 220, 240V/50-60Hz |
| Power Consumption . . . . . | .490 watts (max.)  |

Specifications and design subject to possible modification without notice.



### RESISTORS

5% tolerance, 1/4 watts low-noise type carbon film resistors unless otherwise noted.

k . . . . Kilohm  
M . . . . Megohm

### CAPACITORS

MY . . . . Mylar film capacitor

EL . . . . Electrolytic capacitor

LN . . . . Low-noise type capacitor

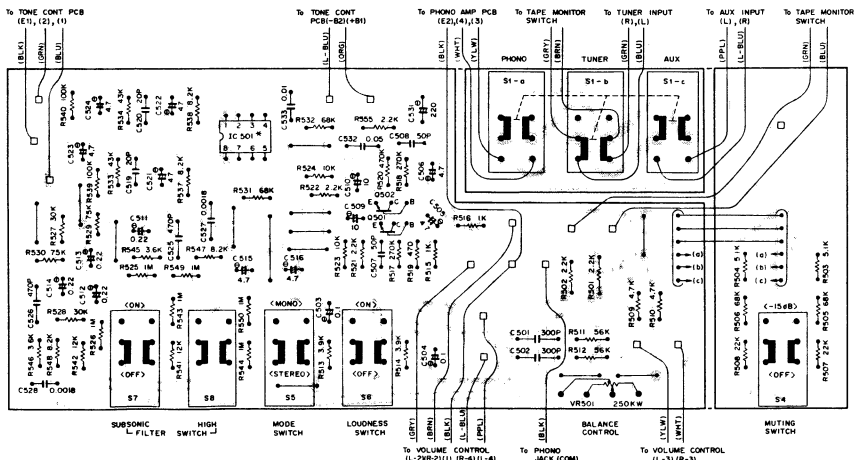
Unless otherwise noted, all capacitance values are expressed in mfd.

### Notes:

- Voltage reading with VTVM from the point shown to the chassis ground.
- Voltage reading tolerance: within 20%

### tone amp and muting switch circuit

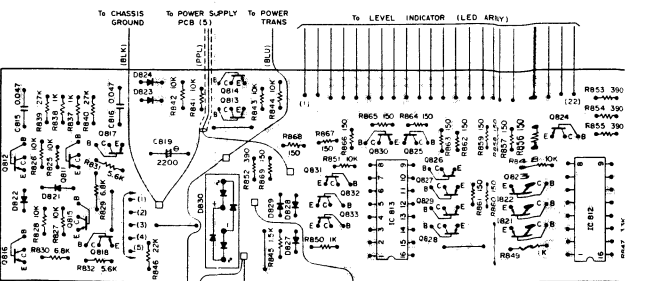
### Circuit d'amplificateur de tonalité et d'interrupteur de sourdine

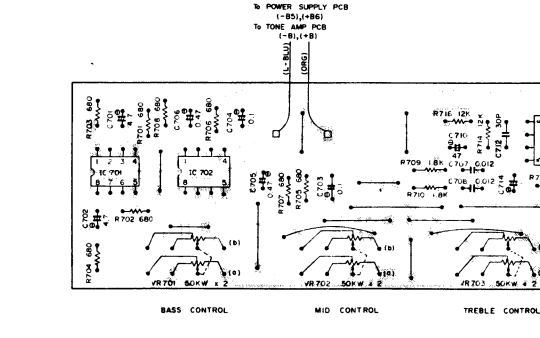
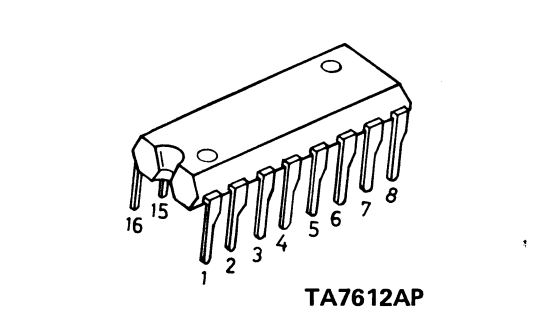
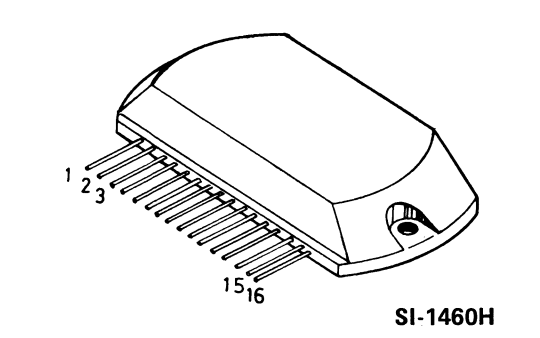
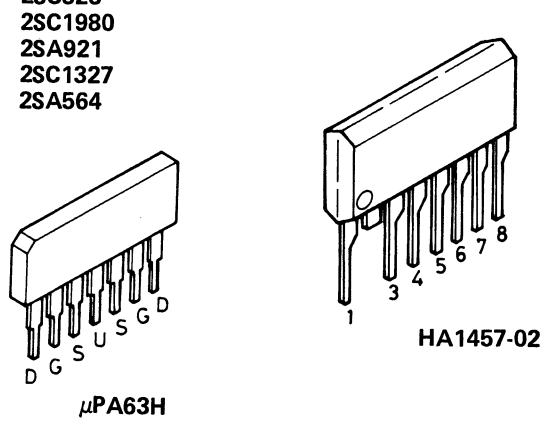
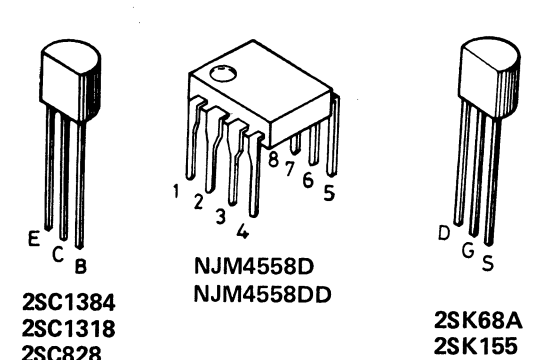
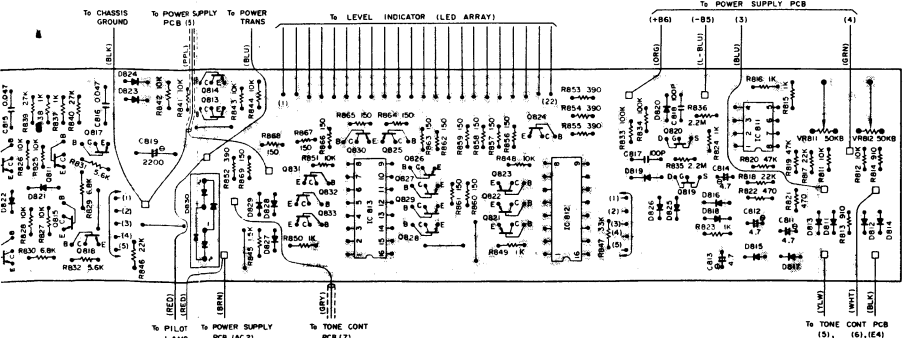
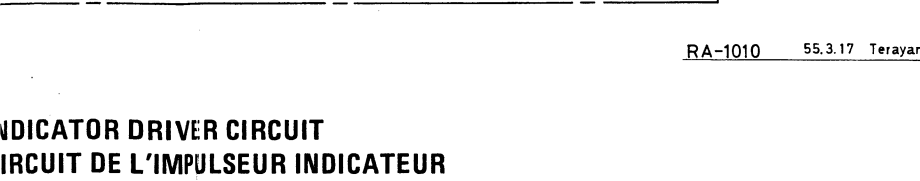
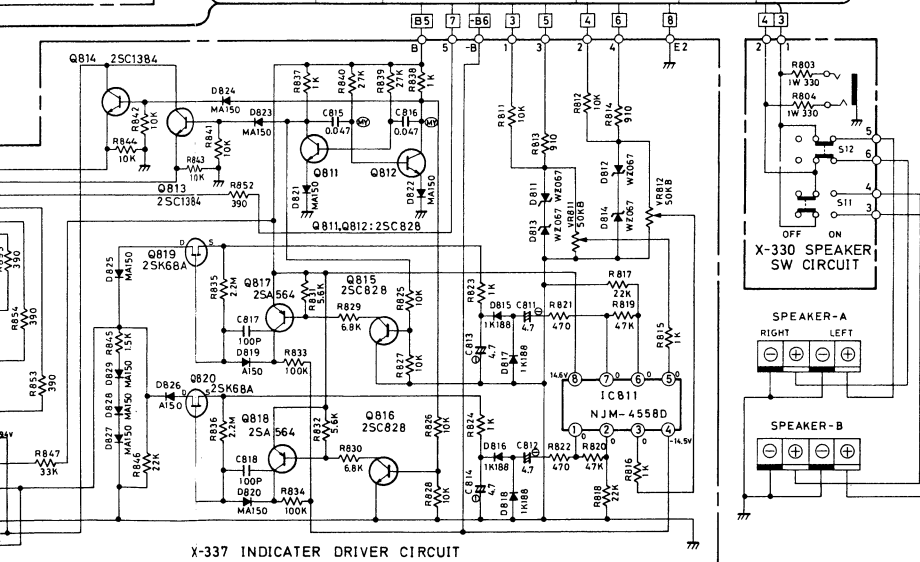
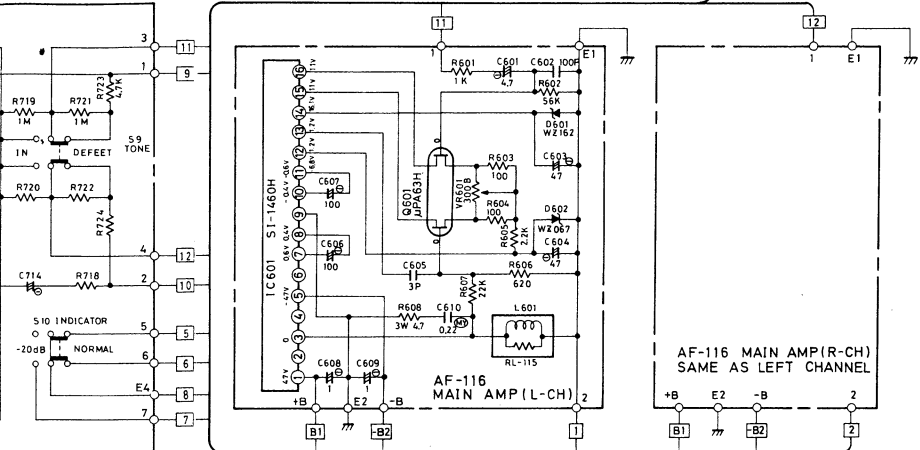
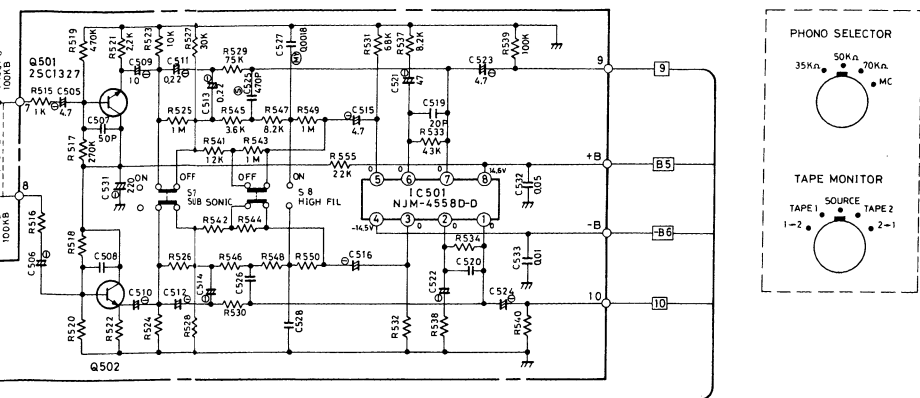


\*IC501 must be Low-noise type.

### Indicator Driver Circuit

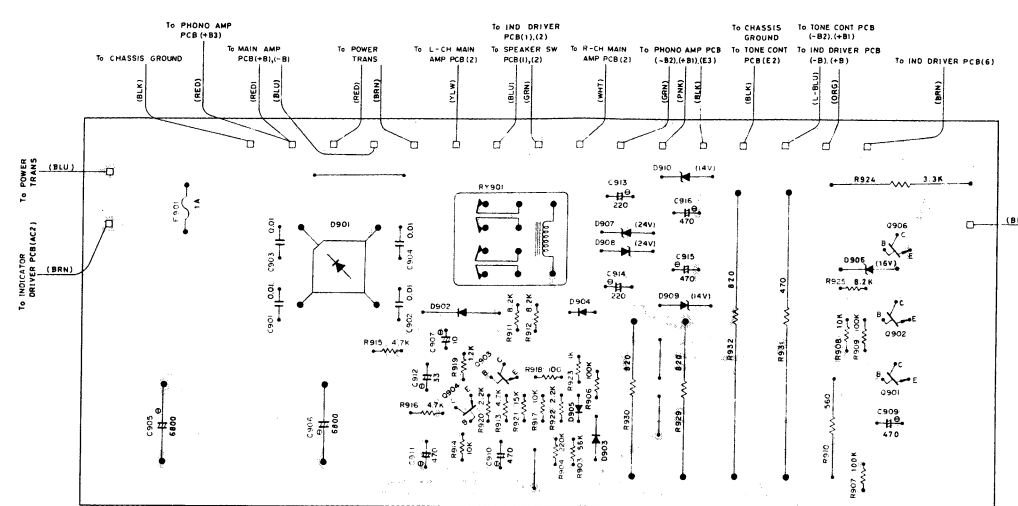
### Circuit de l'impulseur indicateur



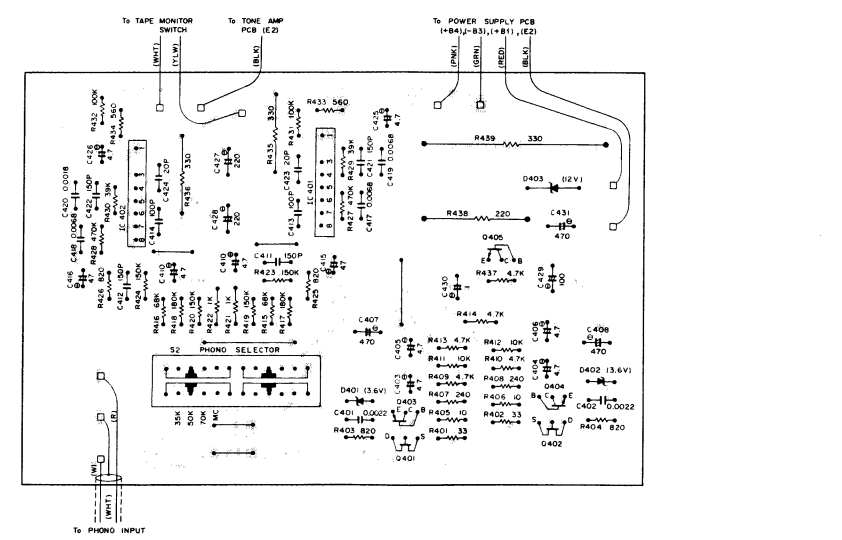


\*IC703 must be Low-noise type.

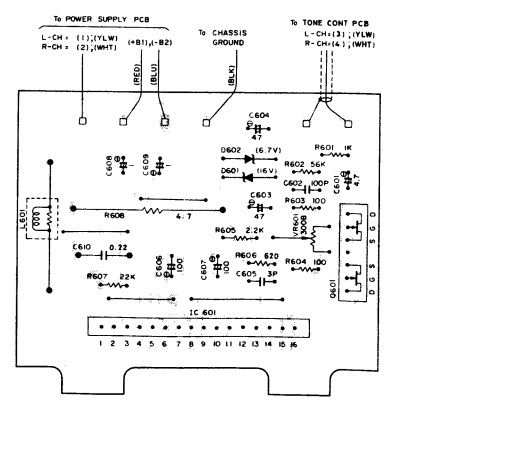
## POWER SUPPLY CIRCUIT CIRCUIT D'ALIMENTATION



## PHONO AMP CIRCUIT CIRCUIT D'AMPLIFICATEUR PHONOGRAPHIQUE



## MAIN AMP CIRCUIT CIRCUIT D'AMPLIFICATEUR PRINCIPALE



## SPEAKER SWITCH CIRCUIT CIRCUIT DU COMMUTATEUR DE HAUT-PARLEUR

